

lower than a liquidus of the molten metallic material;

applying an electric current and a magnetic field simultaneously to the metallic material during a solidification process at temperatures lower than the liquidus of the molten metallic material to crush into small pieces solid crystals of the metallic material generated during the solidification process and to shift the small pieces to a periphery of the metallic material in the container; and

yielding a refined microstructure of the metallic material concentrated in the end portion of the metallic material in the container.

16. (Canceled)

17. (Canceled)

18. (Twice Amended) The method of Claim 15, wherein the electric current and the magnetic field are applied simultaneously to the metallic material at temperatures lower than liquidus thereof during last stages of the solidification process.

Please add new Claim 19 as follows:

19. (New) The method of Claim 15, wherein the crushed solid crystals are shifted to a periphery of the metallic material in a cylindrical container, the axial direction of which is orthogonal to the magnetic field.

REMARKS

Favorable consideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 15, 18 and 19 are presently active in this case, Claims 16 and 17 having been canceled, Claims 15 and 18 having been amended, and Claim 19 having been added by the